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STATE OF MONTANA

BULLETIN

OF THE

Department of Public Health

Vol. 7 April 15, 1914. No. 12

MONTANA STATE BOARD OF HEALTH

HON. S. V. STEWART, Governor.
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EMIL STARZ, Ph. D.
State Bacteriologist,

ALLAN TUFFORD,
Consulting Architect.
M. L. MORRIS,
Consulting Sanitary Engineer.

HELENA, MONTANA.

Published Monthly at Helena, by the State Board of Health.

"The science of disease prevention, if properly applied, can add fifteen years to the present average length of human life."—Prof. Irving Fisher, Yale.

This Bulletin will be mailed monthly to any person in Montana upon request mailed to the Secretary of the State Board of Health at Helena.

ALLIED PRINTING TRADES UNION LABEL COUNCIL HELENA 1

The regular semi-annual meeting of the State Board of Health was held in the office of the Secretary, April 2, 1914.

Regulations covering the preparation and submission of designs for water suppplies and purification works were passed. These regulations will be published in a special bulletin in the near future.

The following regulations, relative to the conducting of restaurants at State fairs were passed:

"First—That prepared foodstuffs, such as bakery goods, confectionery and any fruits that do not have to be skinned or peeled before using, such as apples, pears, peaches, etc., meat products such as veal loaf, pickled pigs' feet, mince meat, boiled ham or other food prepared for eating and subject to the attack of worms or flies, and all fresh meats, whether large or small cuts, chopped meats, hamburger, sausage, liver, hearts and all other edible meats, shall not be displayed for sale unless protected from flies, dust, dirt and all other foreign or injurious contamination by suitable coverings of glass, wood or metal.

"Second—That all kitchen sinks be connected with the sewer or cesspool, or be provided with covered barrels, for the dish and waste water, and also that they be supplied with covered refuse cans, and provision made for their removal at least once each day."

We feel that we have the public behind us in our demand for sanitary restaurants at State fairs. We understand that the State Fair Association has taken steps to provide permanent buildings in which sanitary retsaurants can be conducted. It is to be hoped that the county fair associations will follow the example of State in this respect. It is almost impossible to conduct sanitary restaurants in tents, on account of the fact that they cannot be properly protected against flies. All fair associations provide permanent quarters for the proper care of livestock, but they fail to provide sanitary quarters where the people can be properly fed. We feel that th people are just as important as the pigs.

HEALTH OFFICERS' MEETING.

The meeting of Health Officers for the southern and western parts of the State was held at Missoula on April 18. There was a good attendance and much interest was shown. The following program was carried out:

Program.

9:00 a. m.

1. "The Natural History of the Spotted Fever Tick (Dermacentor Venustus)"—W. .V King, Bureau of Entomology, Florence.

2. "Rocky Moutnain Spotted (Tick) Fever"—L. D. Fricks, Public Health Service, Victor.

3. "Bacteria Carriers"—Dr. F. D. Pease, City Health Officer, Missoula. Discussed by Dr. Max Barbour, Helena, and Dr. G. L. Marquette, Deer Lodge.

Afternoon Session—2:00 p. m.

1. "What the Health Officer Can Do to Prevent the Sale of Decayed Fruits"—M. L. Dean, State Horticulturist, Missoula.

2. "Inspection of Grocery Stores"—F. J. O'Donnell, State Inspector, Helena.

3. "A System of Garbage Disposal for Unincorporated Towns"—Dr. P. H. McCarthy, County Health Officer, Butte. Discussed by Dr. J. J. Flynn, Missoula, and Dr. E. D. O'Neill, Kalispell.

4. "A House Fly Campaign"—Prof. R. A. Cooley, State Entomologist, Bozeman.

Evening Session—7:30 p. m.

1. "Butte's System of Garbage Disposal"—Dr. C. H. Horst, City Health Officer, Butte.

In view of the fact that the fly contributes very largely to the spread of infectious diseases, particularly typhoid, the local and County Health Officers throughout the State are urged to conduct a vigorous campaign during the coming season against this insect.

The fly must have filth in which to breed. If there is no filth there are no flies. See to it that all toilets are fly proof. Typhoid carriers, open toilets, plus the fly, cause much of our typhoid in the State of Montana.

The Food and Drug Commissioners for Idaho, Utah, Wyoming, Nevada and Montana held a meeting at Salt Lake April 8, 1914. An extended report of the proceedings of this meeting will be published in a later bulletin.

AHEAD OF THE RECORD.

"I hope you are following my instructions carefully, Sandy—the pills three times a day and a drop of whisky at bedtime."

"Weel, sir, I may be a wee bit behind wi' the pills, but I'm about six weeks in front wi' the whusky."

OPPORTUNITY.

The druggist danced and chortled till the bottles danced on the shalves.

"What's up?" asked the soda clerk. "Have you been taking something?"

"No," gurgled the dope dispenser gleefully. "But do you remember when our water pipes were frozen last winter?"

"Yes, but what—"

"Well, the plumber who fixed them has just come in to have a prescription filled."—Toledo Blade.

THE FENCE OR THE AMBULANCE.

'Twas a dangerous cliff, as they freely confessed,
  Though to walk near its crest was so pleasant.
But over its terrible edge there had slipped
  A duke and full many a peasant.
So the people said something would have to be done,
  But their projects did not at all tally.
Some said, "Put a fence round the edge of the cliff";
  Some, "An ambulance down in the valley."

But the cry for the ambulance carried the day,
  For it spread through the neighboring city;
A fence may be useful or not, it is true,
  But each heart was brim full of pity
For those who slipped over that dangerous cliff;
  And the dwellers in highway and valley
Gave pound and gave pence, not to put up a fence,
  But an ambulance down in the valley.

"For the cliff is all right if you're careful," they said,
"And if folks even slip or are dropping,
It isn't the slipping that hurts them so much
As the shock down below when they're stopping."
Then an old sage remarked, "It's a marvel to me
That people give for more attention
To repairing results than to stopping the cause,
When they'd much aim better at prevention.

"Let us stop at its source all this mischief," cried he.
"Come, neighbors and friends, let us rally;
If the cliff we will fence we might almost dispense
With the ambulance down in the valley."
"Oh, he's a fanatic," the others rejoined.
"Dispense with the ambulance? Never!
He'd dispense with all charities, too, if he could;
But no! We'll protect them forever;
Aren't we picking folks up just as fast as they fall?
And shall his man dictate to us? Shall he?
Why should people of sense stop to put up a fence
While their ambulance works in the valley?"

But a sensible few, who were practical, too,
Will not bear with such nonsense much longer,
They believe that prevention is better than cure
And their party will soon be the stronger.
Encourage them, then, with your purse, voice and pen,
And while other philanthropists dally)
They will scorn all pretense and put up a stout fence
On the cliff that hangs over the valley.

—Exchange.

COMMUNICABLE DISEASES REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF MARCH, 1914.

Smallpox.—Beaverhead, 1; Broadwater, 1; Blaine, 2; Carbon, 7; Cascade (exclusive of Great Falls), 5; Great Falls, 9; Chouteau, 6; Custer, 2;; Dawson, 6; Anaconda, 2; Fergus, 28; Granite, 16; Gallatin, 9; Hill, 3; Helena, 1; Meagher, 1; Missoula City, 1; Park (exclusive of Livingston), 1; Rosebud, 1; Sanders, 1; Silver Bow* (exclusive of Butte), 14; Butte, 43; Teton, 3; Valley, 2; Yellowstone (exclusive of Billings), 3; Billings, 9. Total, 177. Total last month, 184.

Diphtheria.—Carbon, 2; Great Falls, 1; Custer, 4; Dawson, 2; Kalispell, 1; Hill, 1; Helena, 1; Powell, 1; Sheridan, 1; Butte, 3; Stillwater, 1; Valley, 3; Yellowstone (exclusive of Billings), 2. Total, 23. Total last month, 28.

Scarlet Fever.—Broadwater, 5; Big Horn, 1; Carbon, 15; Great Falls, 2; Chouteau, 3; Custer, 2; Dawson, 3; Flathead (exclusive of Kalispell), 2; Gallatin (exclusive of Bozeman), 1; Hill, 1; Helena, 1; Meagher, 9; Missoula (exclusive of Missoula City), 5; Missoula City, 1; Livingston, 1; Powell, 2; Rosebud, 6; Silver Bow* (exclusive of Butte), 4; Butte, 15; Teton, 4; Valley, 2; Yellowstone (exclusive of Billings), 6; Billings, 17. Total, 108. Total last month, 54.

Typhoid Fever.—Blaine, 4; Cascade ((exclusive of Great Falls), 5; Dawson, 3; Lincoln, 2; Sheridan, 1; Stillwater, 1; Billings, 1. Total, 17. Total last month, 12.

Measles.—Carbon, 60; Great Falls, 46; Custer, 2; Dawson, 1; Fergus, 5; Flathead (exclusive of Kalispell), 7; Gallatin (exclusive of Bozeman), 1; Bozeman, 12; Helena, 52; Meagher, 4; Livingston, 1; Powell, 1; Rosebud, 1; Silver Bow (exclusive of Butte), 20; Butte, 13; Stillwater, 57; Valley, 2; Yellowstone (exclusive of Billings), 16; Billings, 7. Total, 305. Total last month, 596.

Whooping Cough.—Helena, 1. Total, 1. Total last month, 0.

Spotted Fever.—Missoula City, 1; Ravalli County, 2. Total, 3. Total last month, 0.

Tuberculosis.—Helena, 1; Missoula City, 1; Livingston, 1; Sanders, 1; Sheridan, 1; Yellowstone (exclusive of Billings), 4; Billings, 4. Total, 14. Total last month, 3.

C. S. Meningitis.—Cascade (exclusive of Great Falls), 1. Total, 1. Total last month, 2.

Trachoma.—Flathead (exclusive of Kalispell), 1. Total, 1. Total last month, 0.

*Fourteen of the cases of smallpox and one of the scarlet fever cases reported from Silver Bow County originated in the City of Butte, but are confined to the pest house in Silver Bow County, and thus were reported as county cases.

REPORT OF BACTERIOLOGICAL EXAMINATIONS MADE DURING THE MONTH OF MARCH, 1914.

By Emil Starz, Bacteriologist.

March 2, 1914—

Dr. Sproule, Harlem, Montana. Blood for Widal Reaction—Positive.

Dr. P. O'Malley, Chinook, Montana. Blood for Widal Reaction—Positive.

March 3, 1914—

Dr. B. C. Brooke, Helena, Montana. Sputum for Bac. Tuberculosis—Positive.

Dr. A. C. Spooner, Bainville, Montana. Sputum for Bac. Tuberculosis—Positive.

Dr. Sproule, Harlem, Montana. Blood for Widal Reaction—Negative.

Dr. M. Dean, Helena, Montana. Blood for Widal—Positive.

March 4, 1914—

Dr. McCann, Bozeman, Montana. Sputum for Bac. Tuberculosis—Negative.

Dr. G. J. Marquette, Deer Lodge, Montana. Culture for Bac. Diphtheria—Negative.

Dr. W. C. Riddell, Helena, Montana Cerebrospinal Fluid for Meningococci—Positive.

Dr. Hathaway, Glendive, Montana. Glood for Widal Reaction—Positive.

March 6, 1914—

Dr. Justin Simpkins, Glasgow, Montana. Swab for Bac. Diphtheria—Negative.

Dr. J. F. Murphy, Fort Benton, Montana. Swab for B. Diphtheria—Positive.

Dr. P. O'Malley, Chinook, Montana. Blood for Widal—Negative.

Dr. O. M. Lanstrum, Helena, Montana. Sputum for Bac. Tuberculosis—Negative.

Dr. W. F. Hamilton, Havre, Montana—Throat Swab for Bac. Diphtheria—Negative.

March 9, 1914—

Dr. G. J. Ten Brook, Great Falls, Montana. Blood for Widal Reaction—Negative.

Dr. W. C. Riddell, Helena, Montana. Cerebrospinal Fluid for Meningococci—Negative.

Dr. T. D. Tuttle, Warm Springs, Montana. Sputum for Bac. Tuberculosis—Negative.

March 10, 1914—

Dr. W. Thornton, Stevensville, Montana. Blood for Widal—Positive.

March 11, 1914—

Dr. L. M. Moquere, Brady, Montana. Exudate for Ba. Tuberculosis—Negative.

March 12, 1914—

Dr. L. F. Lubeley, Ryegate, Montana. Sputum for Bac. Tuberculosis—Negative.

Dr. Gaylord McCoy, Joliet, Montana. Blood for Widal—Negative.

March 13, 1913—

Dr. W. M. Pierce, Manhattan, Montana. Sputum for Bac. Tubelculosis—Negative.

Dr. Bassow, Havre, Montana. Sputum for B. Tubelculosis—Negative.

Dr. Frizzell, Great Falls, Montana. Blood for Widal Reaction—Positive.

March 14, 1914—

Dr. E. M. Gans, Judith Gap, Montana. Sputum for Bac. Tuberculosis—Negative.

Dr. B. C. Brooks, Helena, Montana. Sputum for Bac. Tuberculosis—Negative.

March 16, 1914—

Dr. J. Chapple, Billings, Montana. Blood for Widal Reaction—Positive.

Dr. B. C. Brooke, Helena, Montana. Pus for Bac. Tuberculosis—Negative.

Dr. P. Cole, Helena, Montana. Culture for Bac. Diphtheria—Negative.

Dr. W. C. Riddell, Helena, Montana. Cerebrospinal Fluid for Meningococci—Negative

March 17, 1914—

Dr. L. Fligman, Helena, Montana. Sputum for Bac. Tuberculosis—Negative.

Dr. W. C. Riddell, Helena, Montana. Swab for Bac. Diphtheria—Negative.

Dr. Russell, Huntley, Montana. Sputum for Tuberculosis Bac.—Negative.

March 18, 1914—

Dr. B. C. Brooke, Helena, Montana. Pus for Tuberculosis Bac.—Negative.

Dr. McCabe, Helena, Montana. Blood for Widal—Negative.

March 19, 1914—

Dr. F. F. Attix, Lewistown, Montana. Blood for Widal—Negative.

March 20, 1914—

Dr. McCabe, Helena, Montana. Blod for Widal—Positive.

Dr. L. Fligman, Helena, Montana. Sputum for Bac. Tuberculosis—Negative.

March 23, 1914—

Dr. McCabe, Helena, Montana. Blood for Widal—Positive.

March 25, 1914—

Drs. Beagle & Cowdy, Sidney, Montana. Sputum for Bac. Tuberculosis—Negative.

Dr. L. Fligman, Helena, Montana. Sputum for Tuberculosis Bac.—Negative.

Dr. C. Seerley, Manhattan, Montana. Sputum for Bac. Tuberculosis—Negative.

March 26, 1914—

Dr. L. R. Packard, Whitehall, Montana. Sputum for Bac. Tuberculosis—Negative.

March 27, 1914—

Dr. R. Horsky, Helena, Montana. Sputum for Bac. Tuberculosis—Negative.

March 28, 1914—

Dr. T. D. Tuttle, Warm Springs, Montana, Tuberculosis

Sanatorium. Sputum for Bac. Tuberculosis—Positive. Shannon Sputum for Bac Tuberculosis—Negative.

Dr. McCabe, Helena, Montana. Blod for Widal—Positive.

March 29, 1914—

Dr. J. G. Thompson, Helena, Montana. Culture for Bac. Dihptheria—Negative.

March 30, 1914—

Dr. W. P. Smith, Columbus, Montana. Blood for Widal—Positive.

BIRTHS (EXCL. OF STILLBIRTHS) REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF MARCH, 1914, AND COMPARATIVE BIRTH AND DEATH RECORD IN THE STATE.

	Males	Females	Totals	Deaths	Excess of Births	Excess of Deaths
Beaverhead	5	7	12	3	9	
Broadwater	....	4	4	1	3	
Carbon	2	3	5	3	2	
Cascade (Excel of)	8	9	17	4	13	
Great Falls	28	14	42	36	6	
Chouteau	9	7	16	5	11	
Custer	13	14	27	12	15	
Dawson	18	23	41	11	30	
Deer Lodge (Excel. of)	....	....	....	7	....	7
Anaconda	16	21	37	15	22	
Fergus	9	11	20	13	7	
Flathead (Excel. of)	10	7	17	8	9	
Kalispell	7	6	13	7	6	
Gallatin (Exce. of)	10	5	15	4	11	
Bozeman	5	5	10	2	8	
Granite	1	5	6	2	4	
Jefferson	5	3	8	1	7	
Lewis and Clark (Excel. of)	2	3	5	2	3	
Helena	16	18	34	17	17	
Lincoln	5	5	10	4	6	
Madison	3	8	11	6	5	
Meagher	7	8	15	3	12	
Missoula (Excel. of)	7	4	11	2	9	
Missoula City	18	19	37	15	22	
Musselshell	10	7	17	5	12	
Park (Excel. of)	6	7	13	2	11	
Livingston	8	9	17	2	15	
Powell	6	3	9	7	2	
Ravalli	10	14	24	7	17	
Rosebud	7	3	10	8	2	
Sanders	3	2	5	5	....	
Silver Bow (Excel of)	22	14	36	28	8	
Butte	40	31	71	69	2	
Sweet Grass	5	6	11	3	8	
Teton	10	14	24	11	13	
Valley	6	6	12	....	12	
Yellowstone (Excel. of)	13	11	24	4	20	
Billings	9	16	25	11	14	
Big Horn	3	3	6	6	....	
Blaine	7	12	19	8	11	
Fallon	....	6	6	....	6	
Hill	12	11	23	13	10	
Sheridan	14	20	34	6	28	
Stillwater	1	....	1	3	....	2
Totals	396	404	800	381	428	9

*Stillbirths—30.

DEATHS (EXCLUSIVE OF STILLBIRTHS*) REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF MARCH, 1914, ARRANGED ACCORDING TO COUNTIES AND PRINCIPAL CITIES.

	Spotted Fever	Small Pox	Tuberculosis	Diphtheria	Scarlet Fever	Measles	Typhoid Fever	Meningitis	Whooping Cough	Pneumonia	Nephritis	Organic Heart Disease	Malignant Tumors	Acute Intestinal Diseases	Violence	Suicide	Alcholism	All Other Causes	Totals
Beaverhead										1					2				3
Broadwater															1				1
Carbon			1							1							1		3
Cascade (Excl. of)										2			1					1	4
Great Falls			1			2	3	1		6		1	1		3	1		17	36
Chouteau							1					1						3	5
Custer			2			1				2	1		1		2			3	12
Dawson			2							3	1							5	11
Deer Lodge (Excl. of			1									2						4	7
Anaconda										1		4	2		2			6	15
Fergus								1		1	2	2	1		1			5	13
Flathead (Excl. of)										1		2			2			3	8
Kalispell			1								1	2	1			1		1	7
Gallatin (Excl. of)										1				2				1	4
Bozeman																		2	2
Granite															1			1	2
Jefferson												1							1
Lewis and Clark (Excel. of)											1							1	2
Helena			1					1			3	3	2	1				6	17
Lincoln												1			2			1	4
Madison			1							3		1						1	6
Meagher												2			1				3
Missoula (Excl. of)															1			1	2
Missoula City	1		1							2		4	1		2			4	15
Mussellshell										2		1				1		1	5
Park (Excl. of)															1			1	2
Livingston											1							1	2
Powell			1									1	1	1		1		2	7
Ravalli	1									1			1		1			3	7
Rosebud											2			2			1	3	8
Sanders															3			2	5
Silver Bow (Excl. of)			8							2	5	1		1	1		1	9	28
Butte			11		1			4		12	1	7	4	1	6	1	1	20	69
Sweet Grass												1						2	3
Teton												2			2			7	11
Valley																			
Yellowstone (Excl. of)				1							1							2	4
Billings			1		1					1		1		1				6	11
Big Horn										1		1	1		1			2	6
Blaine										3		1						4	8
Fallon																			
Hill										1	2	3	1		3			3	13
Sheridan			1										1				1	3	6
Stillwater												1			1			1	3
Totals	2		33	1	2	3	4	7		47	21	46	19	9	39	5	5	138	381

Estimated Population,—420,000.
Monthly Death Rate per 1,000 Population,—.907.
Annual Death Rate per 1,000 Population,—10.88.

DIVISION OF FOODS AND DRUGS.

Dr. W. F. Cogswell, Secretary State Board of Health, Food and Drug Commissioner.

F. J. O'Donnell, Inspector.

LABORATORY STAFF.

W. M. Cobleigh, Chemist.
D. L. Weatherhead, Analyst.
D. B. Swingle, Bacteriologist.
Carl Gottschalck, Assistant Analyst.
Nina Armstrong, Clerk and Stenographer.

LABORATORY REPORT.

Samples Reported During the Month of March.

Classification	Legal No.	Illegal No.	Unofficial	Total
Butter (Dairy Commission)	2	21		23
Butter (Board of Health)			2	2
Miscellaneous	1	1		2
Water				
Total	3	22	2	63

Forty samples were reported to the Secretary of the State Board of Health during the month of March. Of this number two were samples of butter, one a soft drink, one a vanilla extract and thirty-six were samples of water.

The thirty-six samples of water were collected as follows:

Billings	1
Camas	1
Chinook	4
Gardiner	2
Glendive	1
Great Falls	1
Harlem	1
Harlowton	1
Havre	1
Joliet	1
Kalispell	2
Lewistown	3
Livingston	11

Malta	2
Miles City	1
Three Forks	1
Whitefish	1
Whitehall	1
Total	36

A more detailed report of the food samples follows:

No.	Date	Description	Remarks
2013	3-28-14	Vanilla Extract. Dealer, Reinig Co. Helena. On label. Dr. Price's Delicious flavoring extract. Vanilla, full measure, ¼ pint. Price Flavoring Extract Co., Chicago.	Misbranded. Short in volume.
2845	3-4-14	Vin Fiz. A combination of Grape juice and other fruit flavors, bottled by Henry Greenhood, Missoula, contains 1-10 of 1 per cent Benzoate of Soda.	Contains no Saccharin.
Unoff. 32.	3-13-14	Butter. A. E. Van Pelt, Ballantine, Montana.	Butter of poor quality.
Unoff. 33.	3-31-14	Butter. Phil Dodson, Bozeman, Montana.	Butter of poor quality.

A SALESMAN'S BAKING POWDER TEST.

A baking powder test operated by a traveling salesman in a local grocery store may be of some interest. This salesman selected a rival brand of baking powder which was made up entirely of cream of tartar of soda, without any .starch or other filling material. He heated a small amount of water over an alcohol lamp in a metal cup. Then he added a relatively large amount of the baking powder and after it had goen into solution allowed it to cool. This solution was quite concentrated and upon cooling a large lump of Rochelle salt, formed from the action of the soda and cream of tartar upon each other, crystallized out. The demonstrator threw this lump about and called it a rock. His deducation from the test was to the effect that if this baking powder were used in cooking, the biscuits, etc., would contain a large number of small rocks which would have a bad effect on the stomach. He then made the same test with his own baking powder, which contained a filler. No crystal separated out with his baking powder in the test, as the filler being present gave a much less concentrated solution of the other substances. Also his baking powder may not have been a soda and cream of tartar baking powder and may not have produced a substance as readily crystalizable as the Rochelle salt formed with the other baking powder. His deducation then was that his baking powder was much superior to the other.

It is scarcely necessary to say that this test is of no significance whatever. It simply indicates the absence of a filler in the one and its presence in the other baking powder, and is an entirely unfair method of advertising.

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*CHEMICAL STANDARDS FOR THE HYGIENIC PURITY OF MONTANA WATERS.

The public water supplies of Montana are taken from a variety of sources. The purpose of this paper is to show the difference in the composition of the waters from these sources. With these data it will be possible to draw conclusions concerning chemical standards of purity suitable to Montana conditions.

In the mountainous portions of the State city water supplies are taken from streams above human habitation as a rule. These represent the purest waters found in the State and the average of the analyses of thirteen of these water supplies is tabulated below. These samples were collected during the fall and winter months when the organic content was the lowest.

	Parts Per Million.
Solids	99.1
Free Ammonia	.0152
Albuminoid Ammonia	.028
Nitrogen as Nitrites	None.
Nitrogen at Nitrates	.102
Cl	Absent in all Samples.

Shortly after the above results were obtained the writer attempted to use them as a partial guide in passing opinions on the sanitary quality of water supplies taken from the Yellowstone River at various points where there was some reason to suspect that the water was a menace to health. The results of analyses at these points on the river were much higher than could be accounted for by the amount of sewage known to be entering the river. Consequently samples were then taken from the Yellowstone River above the town of Gardinr and above the mouth of the Gardiner River.

This is a point on the Yellowstone River above all sewage contamination and it was expected that the analyses would give results similar to other mountain streams. That this was not the cause is shown by a typical analysis tabulated below:

	Parts Per Million.
Solids	150.00
Free Ammonia	.25
Albuminoid Ammonia	.09
Nitrogen as Nitrites	.0045
Nitrogen of Nitrates	.09
Chlorine	11.50
Oxygen Consumed	1.4

This analysis was checked by taking other samples and it was learned that the Yellowstone River at points above sewage contamination contians more free ammonia and nitrites and at times more albuminoid ammonia than it does at the intakes of the cities using the water, all of which are located at varying distances below sewage outlets.

In this connection it should be stated that the mountain streams flowing into the river below Gardiner contain no nitrites and only a small amount of free ammonia. The dilution, therefore, is a factor in decreasing nitrites and **free** ammonia.

The results so far point to the conclusions that the river water contains more free ammonia and nitrites during the winter months when most of the water in the river comes from Yellowstone Lake than it does in the spring and summer when the flow is increased by melting snow. The varying character of the water above sewage contamination and the fact that the water normally carries substances usually contributed by sewage makes it very difficult to give chemical data obtained at city intakes any diagnostic value. While it is evident in this case that the free ammonia and nitrites do not have their origin in sewage, still the exact source has not been traced so far as the writer knows. It is possible they are developed by chemical action in the geysers and springs of the Yellowstone National Park.

Water of still a different character is found in Northern Montana. The chief sources for city use are the Milk and Missouri Rivers. The waters of these rivers are high in organic watter, which is not derived from city sewage. The organic content increases as the rivers flow to the eastern part of the State, where outcrops of lignite coal frequently occur. The effect of the coal is shown in the following analysis of a spring in a sandstone strata, which is underlaid with lignite coal. The spring is far from any source of contamination:

	Parts Per Million.
Solids	1880.0
Free Ammonia	.186
Albuminoid Ammonia	.28
Nitrites	None.
Nitrates	Trace.
Oxygen Consumed	6.35
Chlorine	5.1

Water of this character flows into both the Missouri and Milk Rivers at numerous places. It is evident that the chemical data on waters of this kind cannot be compared with the data reported on the pure mountain streams.

Another source of water for city use in Montana is the deep well. The following is a typical analysis. The well was drilled, cased and is 610 feet deep. It is located far from any source of contamination:

	Parts Per Million.
Solids	1008.0
Free Ammonia	.235
Albuminoid Ammonia	.037
Nitrogen as Nitrites	.008
Nitrogen as Nitrates	Trace.
Oxygen Consumed	1.25
Chlorine	10.70

It is evident that there is a great variation in the organic content of surface waters in Montana, which are known to be free from sewage contamination. This variation is so great that it is impossible to use a universal chemical standard of purity for all waters of the State. However, it has been possible by carefully studying the qualities of the waters from various sources to adopt local standards of purity, which are very necessary to use in connection with bacteriological data.

*Paper presented at the March meeting of the Illinois Water Association.

Since the above paper was written additional analyses of water samples from various points on the Yellowstone River have been made. The results of these tests are here reported. It should be noted that the samples were taken within two days of each other. The tabulated data is in accordance with the statements made in the paper which were based on previous analyses.

WATER ANALYSES—YELLOWSTONE RIVER.
PARTS PER MILLION.

Laboratory No.	Description.	Date	Solids	Nitrogen As		Nitrogen As		Oxygen Consumed	Chlorine
				Free Ammonia	Albumin Ammonia	Nitrites	Nitrates		
2897	Above the mouth of the Gardiner River.	3-31-14	206.0	0.048	0.044	0.0016	0.2	1.75	18.3
2894	Intake of the Livingston City Water Works Co.	3-30-14	174.0	0.013	0.048	0.002	0.02	2.10	12.4
2899	Intake Billings Water Company.	4-1-14	336.0	0.009	0.039	None	0.16	1.75	11.4
2896	3 miles below Billings sewage outlet.	3-31-14	630.0	0.056	0.053	0.001	0.3	3.1	12.9